
In the Claims

In light of the fact that brackets were used in many of the chemical formulas, the ability to show the examiner which parts of the claim were being amended was not possible. Therefore, please delete claims 42-82 and a new set of claims is being provided consecutively numbered 83-123. Support for these new claims can be found in the originally submitted claims and with reference to the examples found on pages 7-9 of the application as originally filed.

1-41. (previously deleted)

42-82. (deleted)

83. (new) A stabilized composition comprising:

- (a) a halogenated resin;
- (b) at least one phosphite ester selected from the group consisting of
 - (i) triaryl phosphites and C₁₋₉ alkyl substituted derivatives thereof,
 - (ii) C₈₋₁₅ alkyl phosphites,
 - (iii) mixed phosphites having at least one C₈₋₁₅ alkyl moiety and at least one aryl moiety therein, a combination of said moieties totaling three,
 - (iv) C₁₀₋₁₅ alkyl bisphenol-A phosphites,
 - (v) poly- and mono- alkylene glycol phosphites,
 - (vi) C₈₋₁₅ pentaerythritol phosphites,
 - (vii) mono- and di- C₈₋₁₅ alkyl p-cumyl phenol phosphites, and
 - (viii) blends thereof; and
- (c) approximately 50 to 800 ppm zinc.

84. (new) The composition of claim 83 wherein

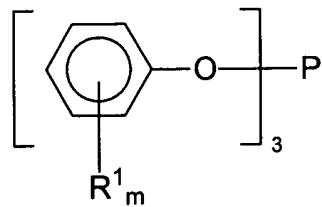
- (a) said zinc is from approximately 100 to 500 ppm.

85. (new) The composition of claim 84 wherein

(a) said zinc is from approximately 100 to 250 ppm.

86. (new) The composition of claim 83 wherein said at least one phosphite ester is selected from the group consisting of

triaryl phosphites and C₁₋₉ alkyl substituted derivatives thereof of formula (I)

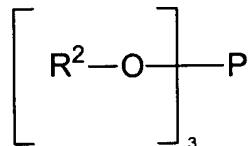


(I)

wherein

R¹ is independently selected from the group consisting of H and C₁₋₉ alkyl, and
m is an integral value from 0 to 1 inclusive,

C₈₋₁₅ trialkyl phosphites of formula (II)

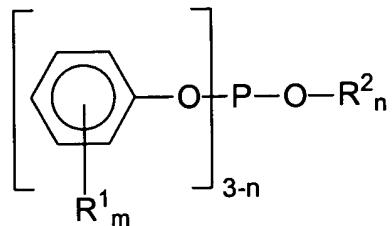


(II)

wherein

R² is selected from the group consisting of C₈₋₁₅ alkyl,

mixed phosphites having at least one C_{8-15} alkyl moiety and at least one aryl moiety of formula (III)

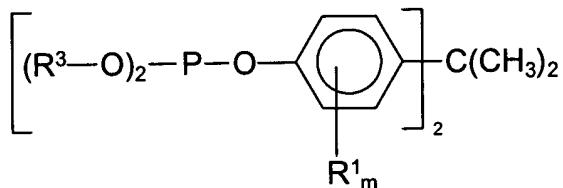


(III)

wherein

- R^1 is as previously defined,
- R^2 is as previously defined,
- m is as previously defined, and
- n is an integral value from 1 to 2,

C_{10-15} alkyl bisphenol-A phosphites of formula (IV)

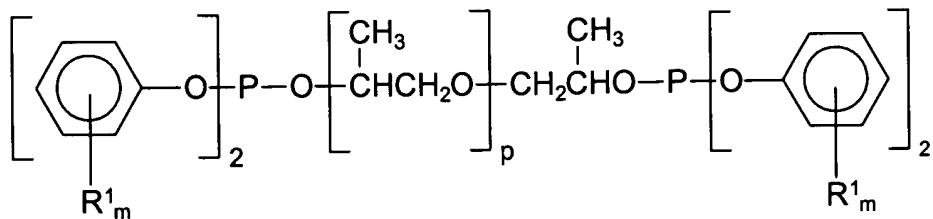


(IV)

wherein

- R^1 is as previously defined,
- R^3 is C_{10-15} alkyl, and
- m is as previously defined,

poly- and mono- alkylene glycol phosphites of formula (V)

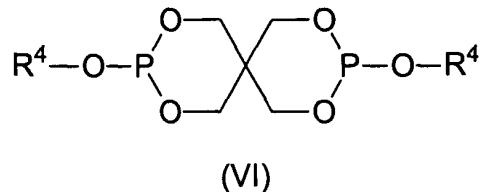


(V)

wherein

- R^1 is as previously defined,
 m is as previously defined, and
 p is an integral value from 0 to 1 inclusive,

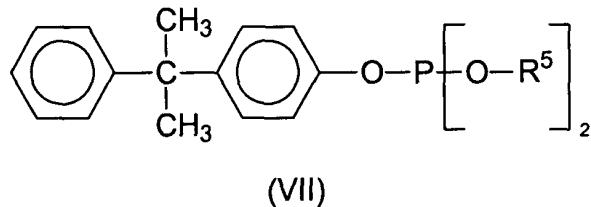
C_{8-15} pentaerythritol phosphites of formula (VI)



wherein

- R^4 is the same as R^1 , and

mono- and di- C_{8-15} alkyl *p*-cumyl phenol phosphites and C_{1-4} alkyl substituted derivatives thereof of formula (VII)



wherein

- R^5 is the same as R^1 .

87. (new) The composition of claim 86 wherein

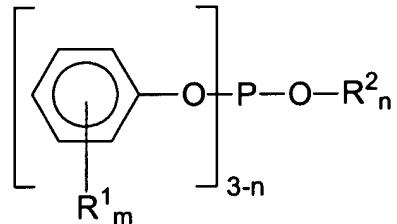
- (a) a percentage weight loss of said composition as measured as a difference between a start and an end weight of said composition as measured after exposure to two hours at 110°C, is less than 1% by weight.

88. (new) The composition of claim 87 wherein

- (a) a percentage weight loss is less than 0.5% by weight.

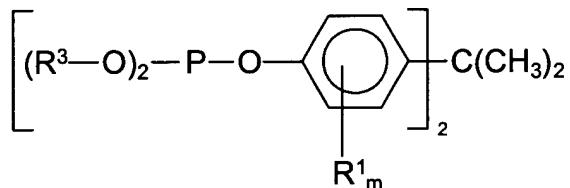
89. (new) The composition of claim 88 wherein said at least one phosphite ester is selected from the group consisting of

mixed phosphites having at least one C₈₋₁₅ alkyl moiety and at least one aryl moiety of formula (III)



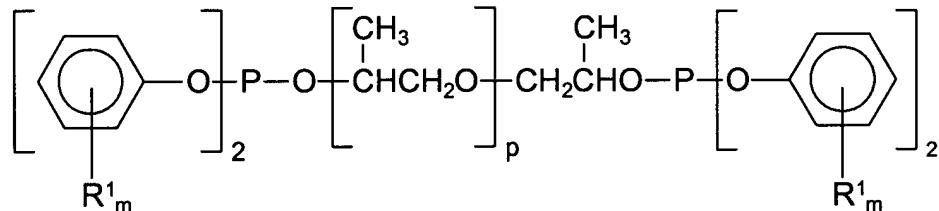
(III)

C₁₀₋₁₅ alkyl bisphenol-A phosphites of formula (IV)



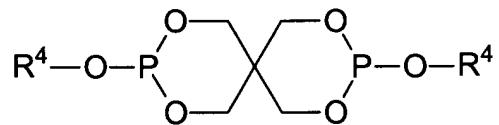
(IV)

poly- and mono- alkylene glycol phosphites of formula (V)



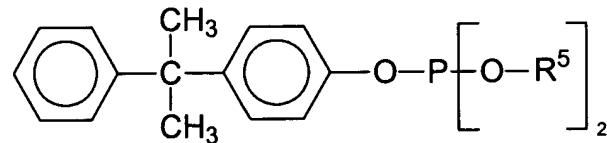
(V)

C₈₋₁₅ pentaerythritol phosphites of formula (VI)



(VI)

mono- and di- C_{8-15} alkyl *p*-cumyl phenol phosphites and C_{1-4} alkyl substituted derivatives thereof of formula (VII)



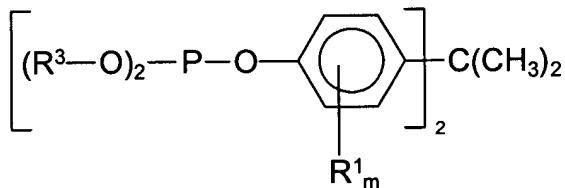
(VII)

wherein

R^1 , R^2 , R^3 , R^4 , R^5 , m , n and p are as previously defined.

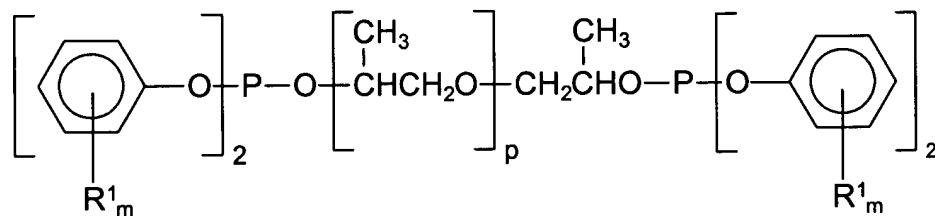
90. (new) The composition of claim 89 wherein said at least one phosphite ester is selected from the group consisting of

C_{10-15} alkyl bisphenol-A phosphites of formula (IV)



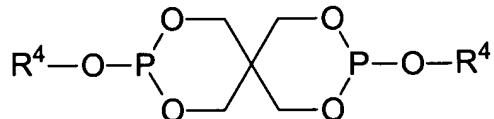
(IV)

poly- and di- alkylene glycol phosphites of formula (V)



(V)

C_{8-15} pentaerythritol phosphites of formula (VI)



(VI)

Wherein

R^1 , R^3 , R^4 , m and p are as previously defined.

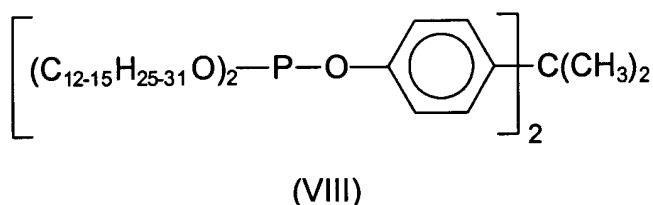
91. (new) The composition of claim 90 wherein

(a) said composition is essentially free of barium, cadmium and calcium.

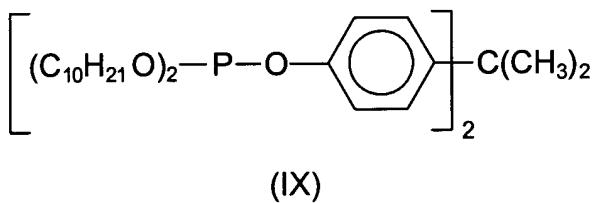
92. (new) The composition of claim 89 wherein

(a) said phosphite ester is selected from the group consisting of

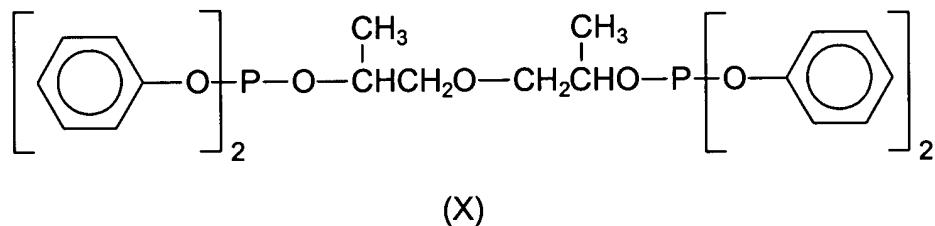
C_{12-15} bisphenol-A phosphite of formula (VIII)



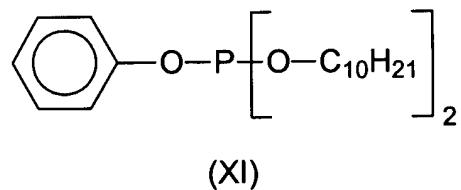
C_{10} bisphenol-A phosphite of formula (IX)



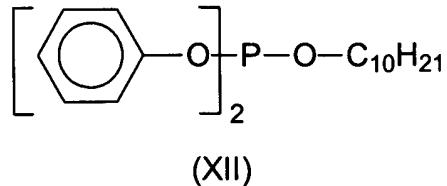
tetraphenyl dipropylene glycol diphosphite of formula (X)



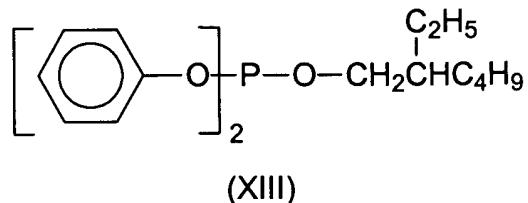
phenyl diisodecyl phosphite of formula (XI)



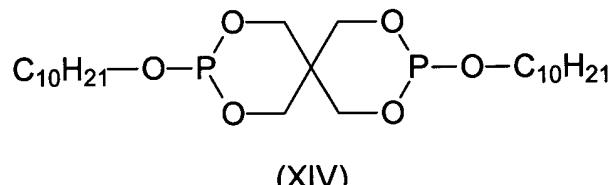
diphenyl isodecyl phosphite of formula (XII)



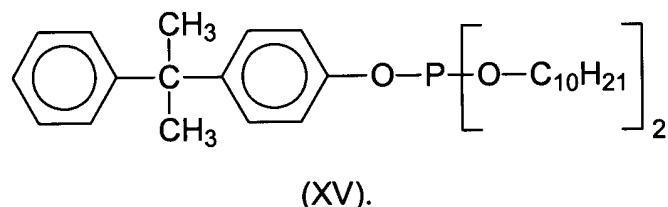
diphenyl 2-ethylhexyl phosphite of formula (XIII)



diisodecyl PE diphosphite of formula (XIV), and



mono *p*-cumyl phenol diisodecyl phosphite of formula (XV)



93. (new) A resin composition comprising:

- (a) a halogenated resin;
- (b) at least one phosphite ester selected from the group consisting of
 - (i) triaryl phosphites and C₁₋₉ alkyl substituted derivatives thereof,
 - (ii) C₈₋₁₅ alkyl phosphites,
 - (iii) mixed phosphites having at least one C₈₋₁₅ alkyl moiety and at least one aryl moiety therein, a combination of said moieties totaling three,
 - (iv) C₁₀₋₁₅ alkyl bisphenol-A phosphites,
 - (v) poly- and mono- alkylene glycol phosphites,

- (vi) C₈₋₁₅ pentaerythritol phosphites,
 - (vii) mono- and di- C₈₋₁₅ alkyl *p*-cumyl phenol phosphites, and
 - (viii) blends thereof; and
- (c) approximately 50 to 800 ppm zinc; and
 - (d) a molar ratio of P/Zn of about 80:1 to 4:1.

94. (new) The composition of claim 93 wherein

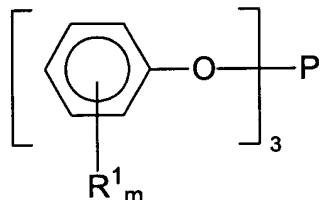
- (a) said zinc is from approximately 100 to 500 ppm; and
- (b) said molar ratio of P/Zn is about 75:1 to 6:1.

95. (new) The composition of claim 94 wherein

- (a) said zinc is from approximately 100 to 250 ppm; and
- (b) said molar ratio of P/Zn is about 73:1 to 8:1.

96. (new) The composition of claim 93 wherein said at least one phosphite ester is selected from the group consisting of

triaryl phosphites and C₁₋₉ alkyl substituted derivatives thereof of formula (I)

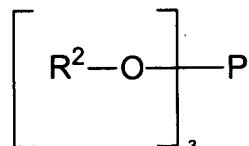


(I)

wherein

- R¹ is independently selected from the group consisting of H and C₁₋₉ alkyl, and
m is an integral value from 0 to 1 inclusive,

C₈₋₁₅ trialkyl phosphites of formula (II)

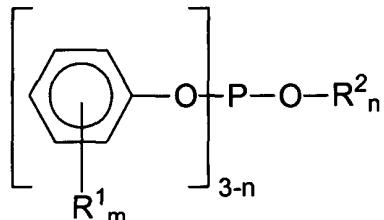


(II)

wherein

R^2 is selected from the group consisting of C_{8-15} alkyl,

mixed phosphites having at least one C_{8-15} alkyl moiety and at least one aryl moiety of formula (III)



(III)

wherein

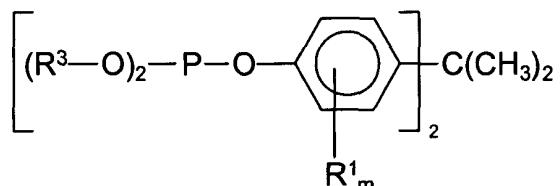
R^1 is as previously defined,

R^2 is as previously defined,

m is as previously defined, and

n is an integral value from 1 to 2,

C_{10-15} alkyl bisphenol-A phosphites of formula (IV)



(IV)

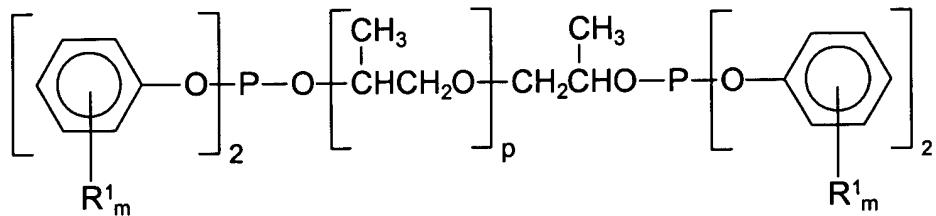
wherein

R^1 is as previously defined,

R^3 is C_{10-15} alkyl, and

m is as previously defined,

poly- and di- alkylene glycol phosphites of formula (V)



(V)

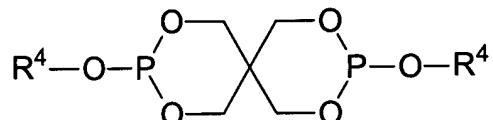
wherein

R^1 is as previously defined,

m is as previously defined, and

p is an integral value from 0 to 1 inclusive,

C_{8-15} pentaerythritol phosphites of formula (VI)

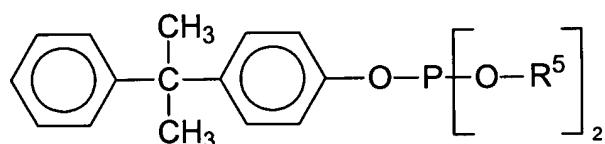


(VI)

wherein

R^4 is the same as R^1 , and

mono- and di- C_{8-15} alkyl *p*-cumyl phenol phosphites and C_{1-4} alkyl substituted derivatives thereof of formula (VII)



(VII)

wherein

R^5 is the same as R^1 .

97. (new) The composition of claim 96 wherein

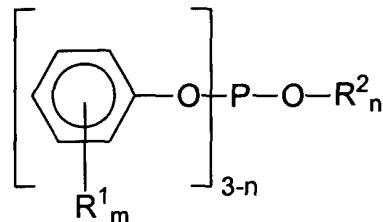
(a) a percentage weight loss of said composition as measured as a difference between a start and an end weight of said composition as measured after exposure to two hours at 110°C, is less than 1% by weight.

98. (new) The composition of claim 97 wherein

(a) a percentage weight loss is less than 0.5% by weight.

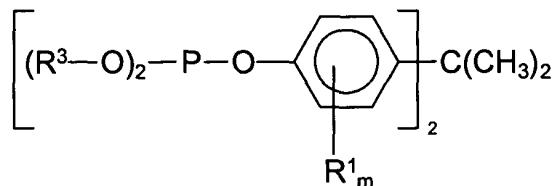
99. (new) The composition of claim 98 wherein said at least one phosphite ester is selected from the group consisting of

mixed phosphites having at least one C₈₋₁₅ alkyl moiety and at least one aryl moiety of formula (III)



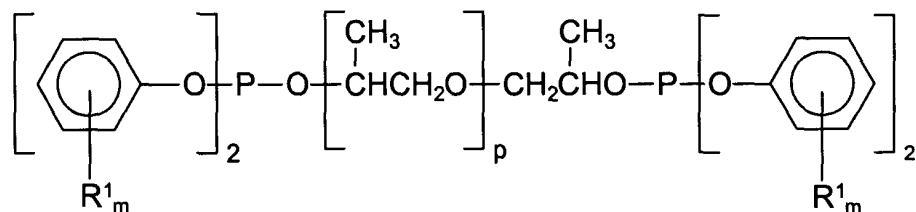
(III)

C₁₀₋₁₅ alkyl bisphenol-A phosphites of formula (IV)



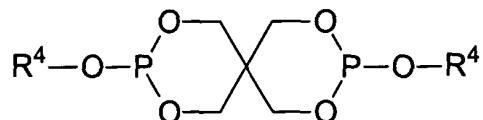
(IV)

poly- and di- alkylene glycol phosphites of formula (V)



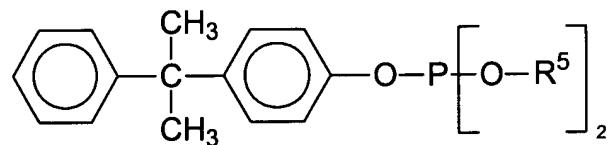
(V)

C₈₋₁₅ pentaerythritol phosphites of formula (VI)



(VI)

mono- and di- C₈₋₁₅ alkyl *p*-cumyl phenol phosphites and C₁₋₄ alkyl substituted derivatives thereof of formula (VII)



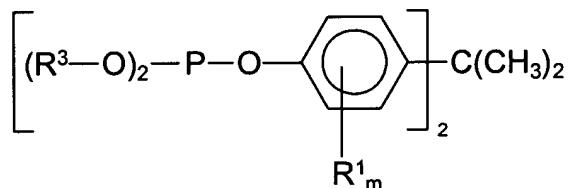
(VII)

wherein

R¹, R², R³, R⁴, R⁵, m, n and p are as previously defined.

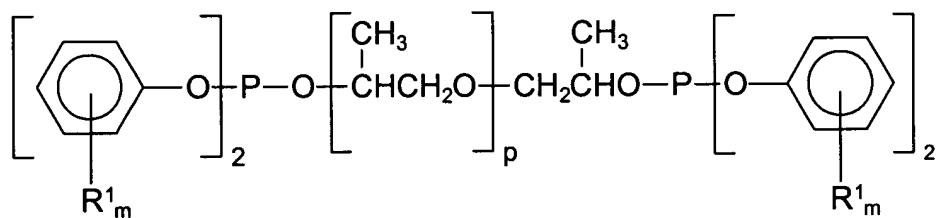
100. (new) The composition of claim 99 wherein said at least one phosphite ester is selected from the group consisting of

C₁₀₋₁₅ alkyl bisphenol-A phosphites of formula (IV)



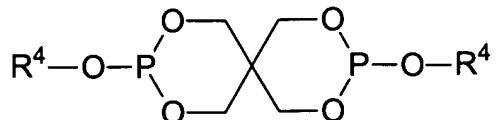
(IV)

poly- and di- alkylene glycol phosphites of formula (V)



(V)

C₈₋₁₅ pentaerythritol phosphites of formula (VI)



(VI)

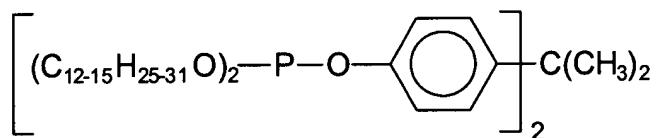
wherein

R^1 , R^3 , R^4 , m and p are as previously defined.

101. (new) The composition of claim 100 wherein said composition is essentially free of barium, cadmium and calcium.

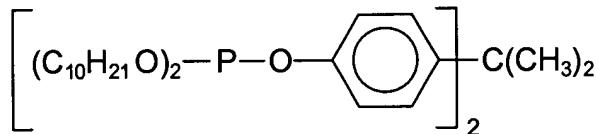
102. (new) The composition of claim 99 wherein

(a) said phosphite ester is selected from the group consisting of
 C_{12-15} bisphenol-A phosphite of formula (VIII)



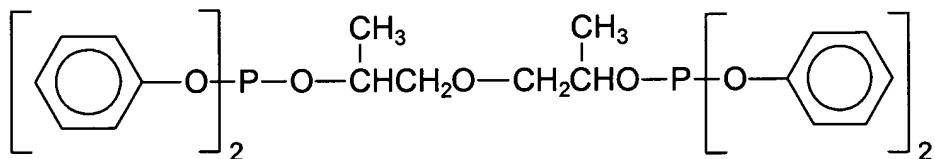
(VIII)

C_{10} bisphenol-A phosphite of formula (IX)



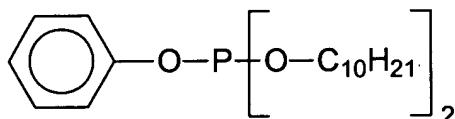
(IX)

tetraphenyl dipropylene glycol diphosphite of formula (X)



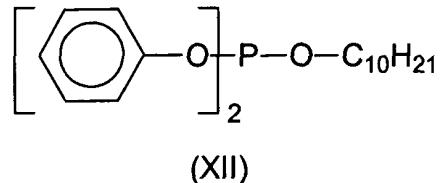
(X)

phenyl diisodecyl phosphite of formula (XI)

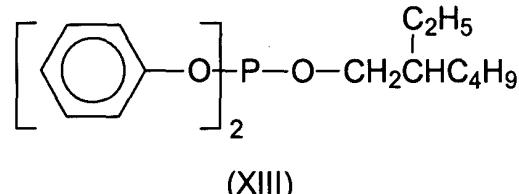


(XI)

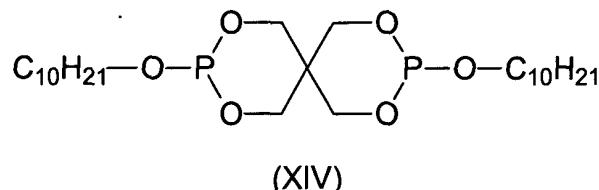
diphenyl isodecyl phosphite of formula (XII)



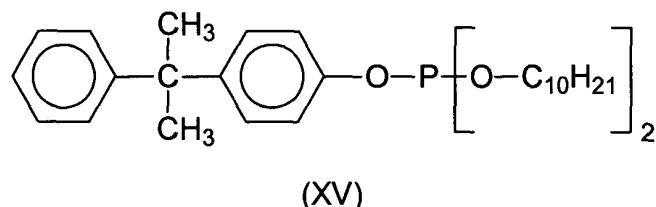
diphenyl 2-ethylhexyl phosphite of formula (XIII)



diisodecyl PE diphosphite of formula (XIV) and



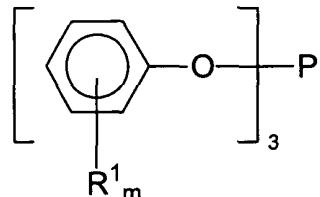
mono p-cumyl phenol diisodecyl phosphite of formula (XV)



103. (new) An essentially toxic-metal free liquid additive composition for use as at least a partial replacement of toxic metal stabilizer additive compositions for use in vinyl-containing resins, wherein the essentially toxic-free composition consists essentially of:

- (a) at least one phosphite ester selected from the group consisting of
 - (i) triaryl phosphites and C₁₋₉ alkyl substituted derivatives thereof,
 - (ii) C₈₋₁₅ alkyl phosphites,
 - (iii) mixed phosphites having at least one C₈₋₁₅ alkyl moiety and at least one aryl moiety therein, a combination of said moieties totaling three,

- (iv) C_{10-15} alkyl bisphenol-A phosphites,
 - (v) poly- and mono- alkylene glycol phosphites,
 - (vi) C_{8-15} pentaerythritol phosphites,
 - (vii) mono- and di- C_{8-15} alkyl *p*-cumyl phenol phosphites, and
 - (viii) blends thereof;
- (b) 0.05 to 0.4 mole percent zinc; and
- (c) 4 to 10 mole percent phosphorus.
104. (new) The composition of claim 103 wherein
- (a) said zinc is from 0.1 to 0.3 mole percent; and
 - (b) said phosphorus is from 5 to 8 mole percent.
105. (new) The composition of claim 104 wherein
- (a) said zinc is from 0.15 to 0.25 mole percent zinc; and
 - (b) said phosphorus is from 6 to 7 mole percent.
106. (new) The composition of claim 105 wherein said at least one phosphite ester is selected from the group consisting of
- triaryl phosphites and C_{1-9} alkyl substituted derivatives thereof of formula (I)

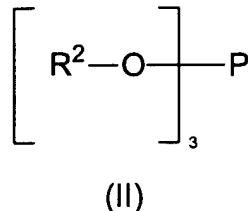


(I)

wherein

- R^1 is independently selected from the group consisting of H and C_{1-9} alkyl, and
- m is an integral value from 0 to 1 inclusive,

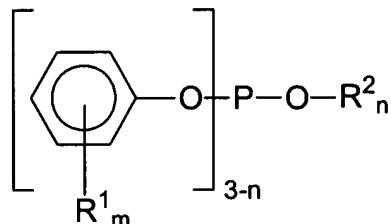
C_{8-15} trialkyl phosphites of formula (II)



wherein

R^2 is selected from the group consisting of C_{8-15} alkyl,

mixed phosphites having at least one C_{8-15} alkyl moiety and at least one aryl moiety of formula (III)



(III)

wherein

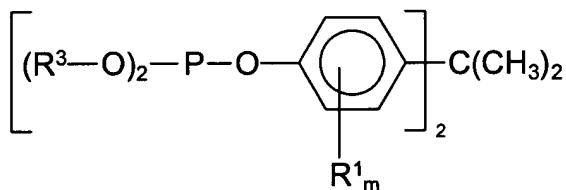
R^1 is as previously defined,

R^2 is as previously defined,

m is as previously defined, and

n is an integral value from 1 to 2,

C_{10-15} alkyl bisphenol-A phosphites of formula (IV)



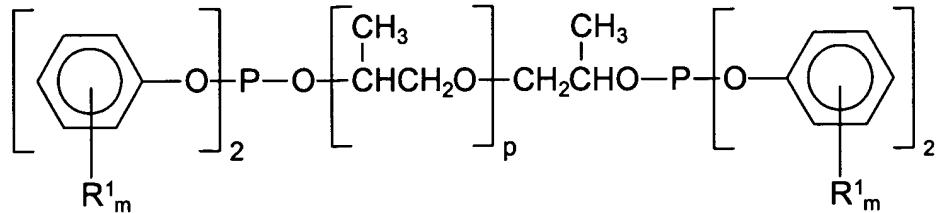
(IV)

wherein

R^1 is as previously defined;

R^3 is C_{10-15} alkyl; and

m is as previously defined,
poly- and di- alkylene glycol phosphites of formula (V)

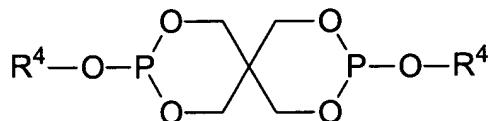


(V)

wherein

R^1 is as previously defined;
 m is as previously defined; and
 p is an integral value from 0 to 1 inclusive,

C_{8-15} pentaerythritol phosphites of formula (VI)

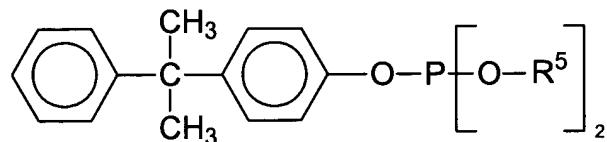


(VI)

wherein

R^4 is the same as R^1 , and

mono- and di- C_{8-15} alkyl *p*-cumyl phenol phosphites and C_{1-4} alkyl substituted derivatives thereof of formula (VII)



(VII)

wherein

R^5 is the same as R^1 .

107. (new) The composition of claim 106 wherein

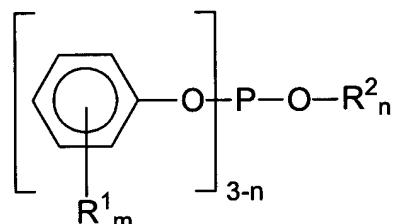
(a) a percentage weight loss of said composition as measured as a difference between a start and an end weight of said composition as measured after exposure to two hours at 110°C, is less than 1% by weight.

108. (new) The composition of claim 107 wherein

(a) a percentage weight loss is less than 0.5% by weight.

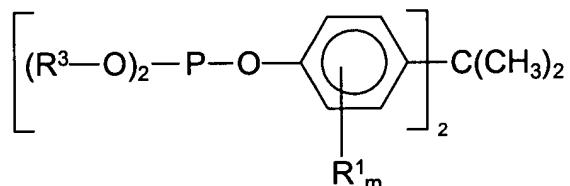
109. (new) The composition of claim 108 wherein said at least one phosphite ester is selected from the group consisting of

mixed phosphites having at least one C₈₋₁₅ alkyl moiety and at least one aryl moiety of formula (III)



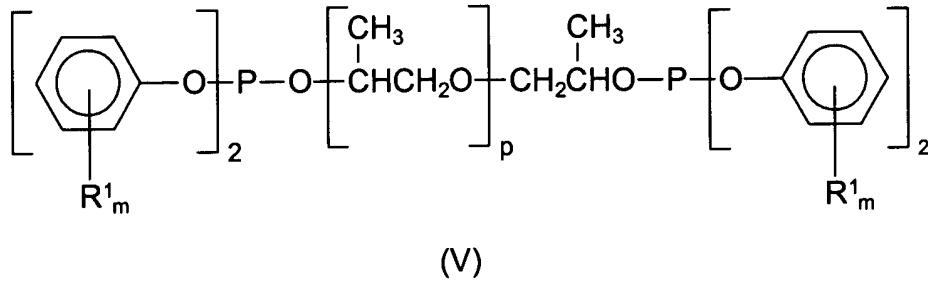
(III)

C₁₀₋₁₅ alkyl bisphenol-A phosphites of formula (IV)

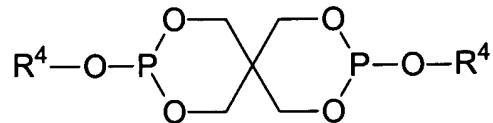


(IV)

poly- and di- alkylene glycol phosphites of formula (V)

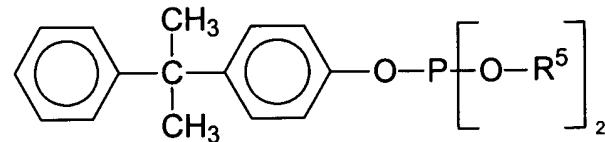


C_{8-15} pentaerythritol phosphites of formula (VI)



(VI)

mono- and di- C_{8-15} alkyl *p*-cumyl phenol phosphites and C_{1-4} alkyl substituted derivatives thereof of formula (VII)



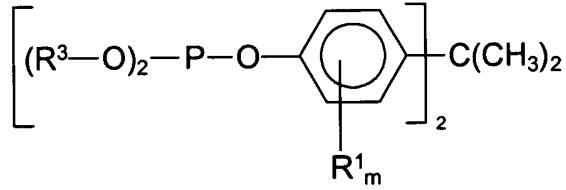
(VII)

wherein

$R^1, R^2, R^3, R^4, R^5, m, n$ and p are as previously defined.

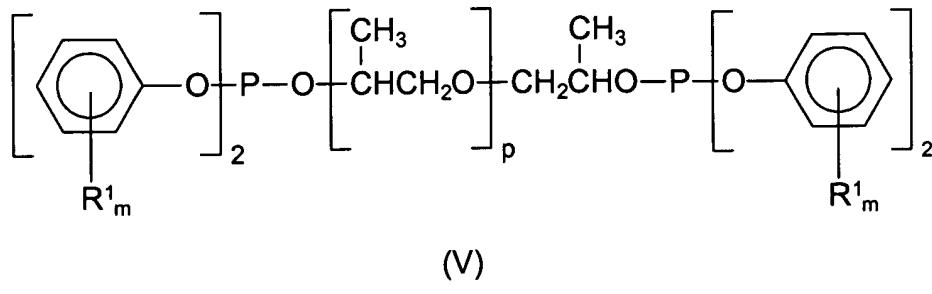
110. (new) The composition of claim 109 wherein said at least one phosphite ester is selected from the group consisting of

C_{10-15} alkyl bisphenol-A phosphites of formula (IV)

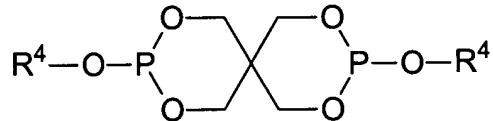


(IV)

poly- and di- alkylene glycol phosphites of formula (V)



C₈₋₁₅ pentaerythritol phosphites of formula (VI)



(VI)

wherein

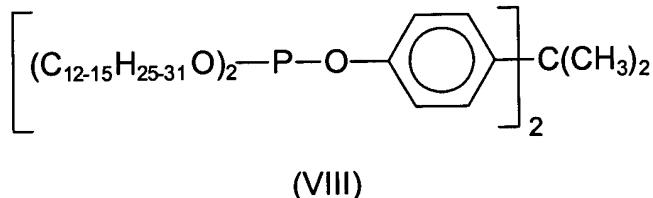
R^1 , R^3 , R^4 , m and p are as previously defined.

111. (new) The composition of claim 110 wherein said composition is essentially free of barium, cadmium and calcium.

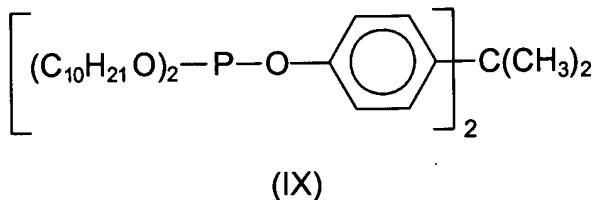
112. (new) The composition of claim 109 wherein

(a) said phosphite ester is selected from the group consisting of

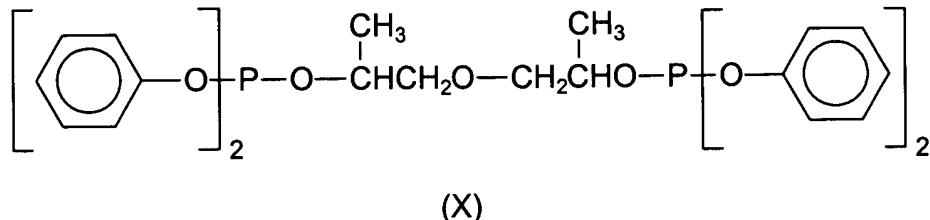
C₁₂₋₁₅ bisphenol-A phosphite of formula (VIII)



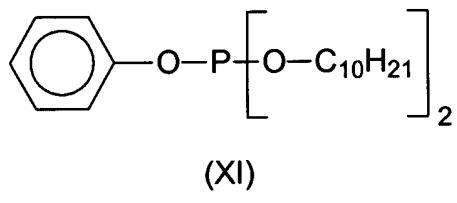
C₁₀ bisphenol-A phosphite of formula (IX)



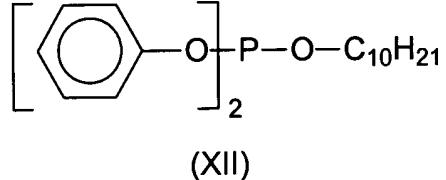
tetraphenyl dipropylene glycol diphosphite of formula (X)



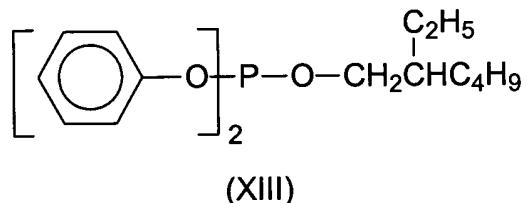
phenyl diisodecyl phosphite of formula (XI)



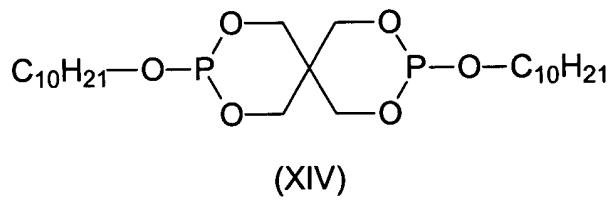
diphenyl isodecyl phosphite of formula (XII)



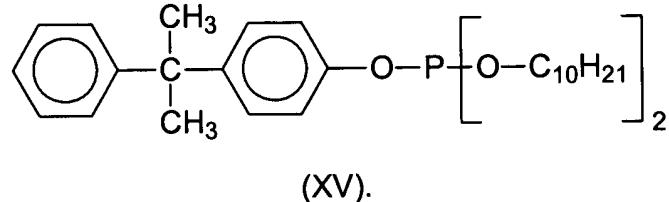
diphenyl 2-ethylhexyl phosphite of formula (XIII)



diisodecyl PE diphosphite of formula (XIV), and

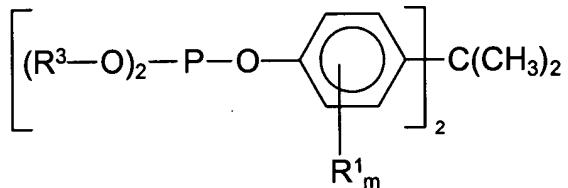


Mono *p*-cumyl phenol diisodecyl phosphite of formula (XV)



113. (new) An additive composition for polyvinyl chloride resin which consists essentially of:

(a) at least one phosphite ester selected from the group consisting of C_{10-15} alkyl bisphenol-A phosphites of formula (IV)



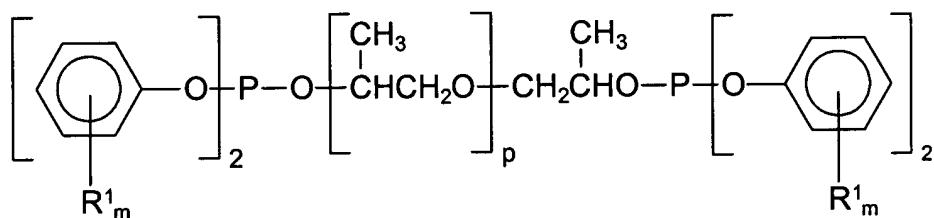
wherein

R^1 is independently selected from the group consisting of H and C_{1-9} alkyl,

R^3 is C_{10-15} alkyl, and

m is an integral value from 0 to 1 inclusive,

poly- and di- alkylene glycol phosphites of formula (V)



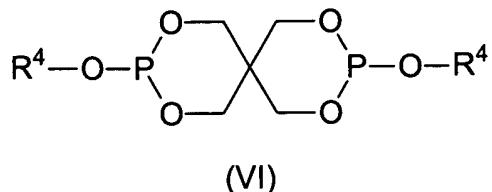
wherein

R^1 is as previously defined;

m is as previously defined; and

p is an integral value from 0 to 1 inclusive,

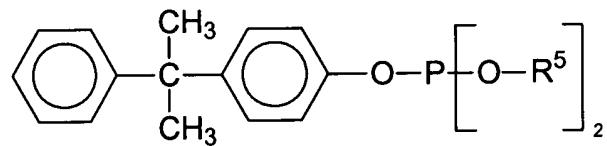
C_{8-15} pentaerythritol phosphites of formula (VI)



wherein

R^4 is the same as R^1 , and

mono- and di- C_{8-15} alkyl *p*-cumyl phenol phosphites and C_{1-4} alkyl substituted derivatives thereof of formula (VII)



wherein

R^5 is the same as R^1 ; and

(b) zinc wherein a molar ratio of P/Zn ranges from 80:1 to 4:1.

114. (new) The composition of claim 113 wherein

(a) said molar ratio of P/Zn ranges from 75:1 to 6:1; and

(b) said zinc is a zinc carboxylate.

115. (new) The composition of claim 114 wherein

(a) said molar ratio of P/Zn ranges from 73:1 to 8:1; and

(b) said zinc carboxylate is selected from the group consisting of zinc octoate, zinc 2-ethylhexoate, zinc hexoate, zinc neodecanoate, zinc decoate, zinc dodecanoate, zinc isostearate, zinc oleate, zinc stearate, zinc tallow fatty acids, zinc palmitate, zinc myristate, zinc laurate, and zinc benzoate.

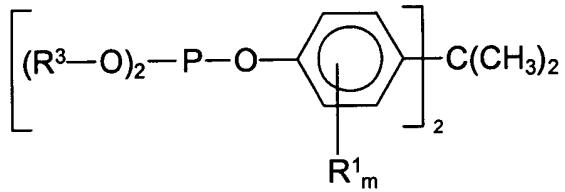
116. (new) The composition of claim 115 wherein

(a) said composition is substantially free of any other metallic stabilizer components.

117. (new) The composition of claim 116 wherein

(a) said phosphite is selected from the group consisting of

C_{10-15} alkyl bisphenol-A phosphites of formula (IV)



(IV)

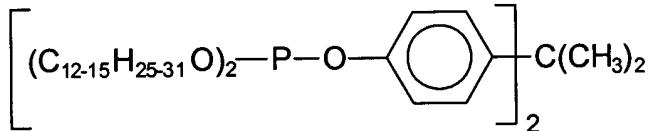
wherein

R^1 , R^3 , and m are as previously defined.

118. (new) The composition of claim 117 wherein

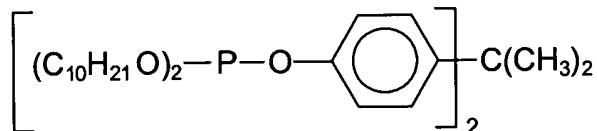
(a) said phosphite ester is selected from the group consisting of

C_{12-15} bisphenol-A phosphite of formula (VIII) and



(VIII)

C_{10} bisphenol-A phosphite of formula (IX)

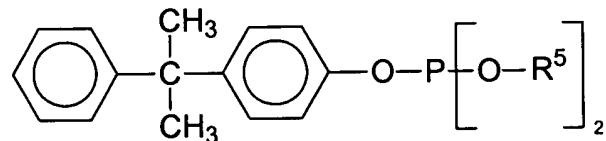


(IX).

119. (new) The composition of claim 113 wherein

(a) said phosphite ester is

p-cumyl phenol phosphite is of formula (VII)



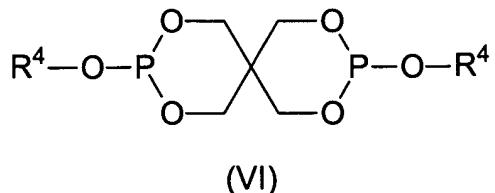
(VII)

wherein

R^5 is as previously defined.

120. (new) The composition of claim 113 wherein

- (a) said phosphite is selected from the group consisting of
pentaerythritol phosphite of formula (VI)

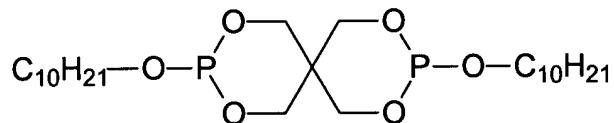


wherein

R^4 is as previously defined.

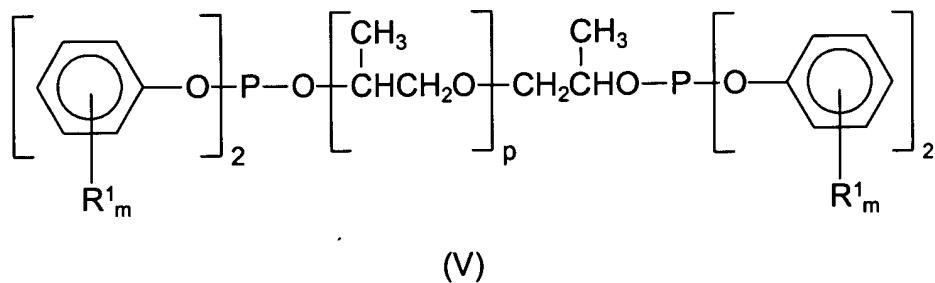
121. (new) The composition of claim 120 wherein

- (a) said phosphite is



122. (new) The composition of claim 113 wherein

- (a) said phosphite ester is a
poly- and di- alkylene glycol phosphites of formula (V)

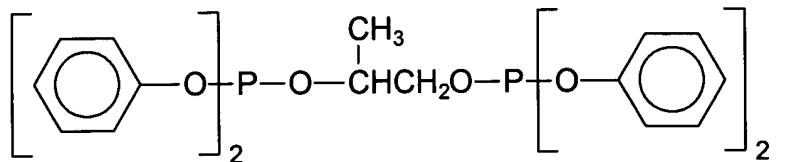
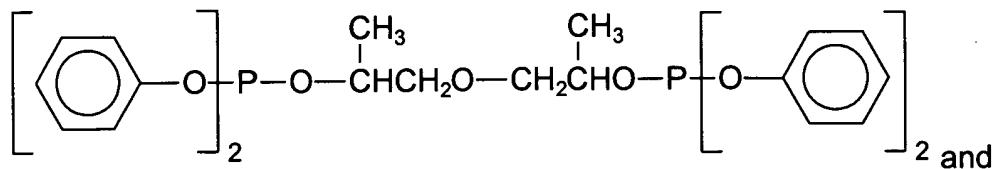


wherein

R^1 , m , and p are as previously defined.

123. (new) The composition of claim 122 wherein

(a) said polydialkylene glycol phosphite is selected from the group consisting of



Claim to Priority

The Petitions Office has granted the pending petition by the applicant to correct the claim to priority under 35 U.S.C. §119(e). A corrected declaration which identifies the correct filing date of the provisional application was filed with the previous response.

In light of the granting of the petition, the applicant's attorney respectfully requests that the following amendment be made to page 1 of the specification. After the title, and before the Technical Field of the Invention, please insert

-- This application claims priority from United States provisional patent application serial number 60/273,303 filed March 2, 2001, United States provisional patent application serial number 60/314,181 filed March 16, 2001, and United States provisional patent application serial number 60/315,746 filed August 29, 2001. --

A replacement page has been provided.

Status

The application presently contains the following claims:

<i>Independent Claim #</i>	<i>Dependent Claim #s</i>
83	84-92
93	94-102
103	104-112
113	114-123

Claims 42-82 are deleted in this amendment, claims 1-41 having been previously deleted, while claims 83-123 are newly submitted. Support for the newly submitted claims may be found in the originally submitted claims and with specific reference to pages 7-9 of the specification as originally submitted. The applicant's attorney thanks the examiner for his thorough examination and the observations contained within the office action. The inventors and their attorney respectfully disagree with many of the conclusions drawn by the examiner with regard to the *Prior Art*, and through the thorough response presented, solicit the examiner to revisit his initial conclusions regarding the patentability of this invention.

The scope of the covered phosphites has been narrowly tailored to match the unexpected results found through experimentation by the applicant. Additionally, the alkyl substitution range has been narrowed to more closely match that provided through the specific examples found on pages 7-9 of the specification as originally filed.

U.S.C. §112, Second paragraph and Responsive Arguments

The examiner has rejected claims 62-71 (see newly submitted claims 103-112) under this section as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The examiner has rejected claims 62-64 (see newly submitted claims 103-105) under this section in that it was represented that component (b) was in terms of both a molar ratio and a percentage. Corresponding newly submitted claims 103-105 removes this basis for this rejection by stating only the mole percent of zinc and phosphorus. The applicant's attorney thanks the examiner for his helpful suggestion. Claim 62 (see newly submitted claim 103) was additionally rejected for use of the term "effective amount." While the applicant has seen this term used in numerous granted patents, in a spirit of cooperation, this wording has been removed in favor of a more definite percentage.

The examiner has still further rejected claims 63-64 (see newly submitted claims 103-104) in that the claim related to dosage in a polymer or resin, but the claims were directed to an additive formulation. The examiner was quite correct and the offending language removed.

The examiner rejected claims 72-82 (see newly submitted claims 113-123) for failing to accurately define the combination of ppm and phr. This inconsistency has been removed and the applicant's attorney thanks the examiner for his astute observations. Only a molar ratio is now recited.

The examiner rejected claims 72-75 (see newly submitted claims 113-116) for similar reasons advanced for claims 63-64. In an analogous manner to the previous claims, these claims have been amended to remove this ambiguity between ppm and phr.

The examiner has rejected claims 73-75 (see newly submitted claims 114-115) for an inconsistency between dosage in a polymer when in fact the claims covered an additive formulation only. The basis for this inconsistency has now been removed.

The examiner has rejected claims 42-51 (see newly submitted claims 83-92) under this section for confusingly combining ppm and phr in a manner similar to that above. The phraseology has been removed and only the ppm values have been

retained. Similar issues were raised with claims 52-61 (see newly submitted claims 93-102) and have also correspondingly been amended through the submission of new claims.

37 C.F.R. §1.75(c) Claim objections

The examiner has objected to claims 51, 61, and 71 (see newly submitted claims 92, 102, 112) for failing to further limit the subject matter of a previous claim. The examiner was correct in his observations, and the applicant has amended the dependency of the applicable claims to correct this deficiency. The examiner has additionally noted that claims 79-80 (see newly submitted claims 120-121) also suffer from this improper form regarding the ester denoted PE phosphite. Once again, the examiner is correct and this ester has been removed from the dependent claim.

Objections to the Specification

The examiner has objected to the Specification because of the incorporation of "phr" in various tables, namely Tables III, V, VII, IX, XI, XIII, XIX, and XXI. The applicant's attorney has corrected this deficiency by renaming this column heading to "Parts." The meaning is clear in that the base resin is indicated to contain 100 parts with the various additives being added in their respective amounts. Appropriate replacement pages are provided herein.

35 U.S.C. §102 Rejection & Responsive Arguments

The examiner has rejected claims 62-77 and 79 (see newly submitted claims 103-118 and 120) under this section, subparagraph (b) as being anticipated by Valdiserri (US 4,614,756 hereinafter '756). The examiner noted that claims 72-82 (perhaps referring to the independent claim 72 and corresponding dependent claims 73-82) used the term "comprising" and therefore, did not exclude the tin additive of '756. It is respectfully submitted that as submitted via this amendment, both independent additive claims use the transitional phrase "consisting essentially of" language which should overcome the examiner's rejection. As clearly recognized by the examiner, the transitional phrase

"consisting essentially of" limits the scope of the claim to the specified materials "and those that do not materially affect the basic and novel characteristic(s)." *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) (emphasis in original) See also M.P.E.P, §2111.03 (8th Ed., rev. 1). Tin is an element which directly impacts the basic and novel characteristics of the additive by itself. Therefore, the use of this transitional phrase is believed to overcome the rejection of claims 62-71 (see newly submitted claims 103-112) based on *Valdiserri*.

The rejection of claims 66-71 (see newly submitted claims 107-111) predicated on the results of a specified test is believed to have been overcome in light of the amendments made to the independent claim from which these claims depend.

35 U.S.C. §103 Rejection & Responsive Arguments

The examiner has rejected claims 78 and 80-82 (see newly submitted claims 119 and 121-122) under this section, subparagraph (a) as being unpatentable over *Valdiserri* identified above.

Valdiserri '756

Valdiserri '756 teaches the use of zinc at a level of 0.125 to 0.25 phr (or equivalently 1250 to 2500 ppm). See Tables 1-2 and Examples #19-20. By contrast, the *Stevenson et al.*, invention uses zinc in the resin at a level of 50-800 ppm. This is more than an order of magnitude greater than the minimum amount of Zn in the resin required by *Stevenson et al.*, and more than 3 times the maximum. Additionally, it must be noted that the goal of *Valdiserri* was to reduce the amount of organo tin mercaptide used. There is no teaching in the '756 patent of how it can be eliminated. In fact, the patent teaches that it is required. The "consisting essentially of" language precludes the addition of the organo tin mercaptides taught in the *Valdiserri* reference.

As indicated previously, it is important to place this technology into context. Tin stabilizers can be divided into two main groups, the first containing stabilizers with tin-

oxygen bonds and the second stabilizers with tin-sulfur bonds. In the first group are tin carboxylates, which provide an excellent light and weathering stability to PVC products and find rising use particularly in outdoor applications. Some examples are transparent panels and translucent double-wall panels for greenhouses. Specific stabilizers within this group include octyltinmaleates, which are approved for the production of blow molding films, like candy wrapping.

The second group is often described as tin mercaptides. These stabilizers are highly efficient and allow the production of crystal clear, rigid vinyl articles even under high-demanding processing conditions. ***Tin mercaptides have a typical characteristic odor, which might be nuisance during processing.*** They show moderate light-stability. The most powerful compounds within the mercaptide class are the mercapto-acetate (thioglycolate) ester derivates and these are the most common tin compounds applied today. The tin mercaptides are usually mixtures of di-alkyl and mono-alkyl tin-compounds, of which the ratio can be varied to create stabilizers with best performance, mainly dependent upon the used PVC-type and the end-use application.

It is only the *Stevenson et al.*, invention that shows how organo tin mercaptide can be eliminated with the attendant benefit of removing any maliferous odor typically associated with mercaptides. This is claimed in the independent claims pending in this amendment response. The examiner has correctly noted that the rejected claims were drawn to additive formulations which are devoid of resin, therefore the zinc limitation as the additive is used in a resin was not a distinguishing factor. However, the "consisting essentially of" language precludes the incorporation of organo tin mercaptides into the additive package, and the claims as amended are not anticipated by *Valdiserri*.

Additionally, the claims as amended also distinguish over *Valdiserri* in a nonobvious way in that the rejected claims have shown an additive package which eliminates a required alkyl tin mercaptide component. There is no teaching within *Valdiserri* as to how this could be accomplished. Therefore, one of *ordinary skill* in the art would read *Valdiserri* and conclude that while various phosphites are useful in the stabilization of PVC, (see col. 2, lines 10-31 of '756), when used in combination with zinc compounds, (see col. 2, lines 32-35 of '756), the reader would equally be guided by the

teachings that alkyl tin mercaptide stabilizers, e.g., alkyl esters of dialkyl tin bis mercapto carboxylic acids were also essential (see col. 2, lines 58-60 through col. 3, lines 1-9). The ability to eliminate this additional heavy metal, tin, is nowhere taught in the patent, nor is there any teaching as to how this may be accomplished.

The examiner has commented on the breath of the phosphites claimed and used this to buttress the argument for obviousness. Through amendment, the applicant's attorney has amended the claims to more narrowly tailor the range of effective phosphites, this narrowed range of effective phosphites not taught in the *Valdeserri* patent. The narrowed range does show unexpected results, none of which are rendered obvious through the teachings of *Valdeserri*.

These unexpected results are clearly shown in FIG. 5 for example, where two conventional *Prior Art* stabilizer packages were employed, one using Ba/Zn and another using Ba/Cd in comparison to Dover's *PhosBooster* combination of *DoverPhos* 12 (Formula #10) and *DoverPhos* 675 (Formula #4). That similar results could be obtained based on a Yellowness Index factor using an order of magnitude less heavy metals is counter to the thinking of the *Prior Art*. The essentially insignificant weight loss when compared to *Prior Art* stabilizer packages is also illustrated in FIG. 7 where it is clearly shown that there are significantly less fugitive emissions. Still further evidence is shown in FIG. 6 wherein the *PhosBooster* combination outperformed conventional *Prior Art* packages over time based on an increased resistance to yellowing. These are unexpected results which would not have been predicted by any teaching in *Valdeserri*.

Minagawa et al., '756

The examiner has rejected claims 62-68 (see newly submitted claims 103-109) under this section, subparagraph (a) over Minagawa et al., US 4,282,141 ('141).

The examiner has identified col 10, lines 55-65 as pertinent wherein the amount of metal salt used was identified as ranging from 0.01 to 10 per 100 parts resin. While this is correct, it is equally important to note that the patent requires the use of a 1,3-diketone compound in conjunction with the metal salt. The essence of the invention involves the

formation of zinc coordination complexes with the diketone, a facet which is not present in the *Stevenson et al.*, invention.

This is significant in that an emerging goal in the stabilizer industry is to develop nonfugitive liquid stabilizers that are nonfugitive both during and subsequent to the processing of PVC compounds and fabricated products. Many commercial liquid mixed metal heat stabilizers, because of their complex compositions and inherent reactivity, give rise to undesirable fugitive emissions during and subsequent to the processing of PVC compositions in which they are contained. These fugitive emissions manifest themselves as odors, vapors, and reportable VOC's in the work area. They often concurrently result in the deposition of incompatible, sticky deposits (plate out) on processing equipment. In their worst form, fugitive species continue to be emitted slowly from fabricated vinyl films and articles giving rise to downstream odors, monomolecular films and tacky exudates which interfere with printing operations and generally detract from the aesthetic qualities of the PVC article. The volatility characteristics are inherent based on the choice of any combination of materials. However, it is the express choice of *Stevenson et al.*, to exclude volatiles which is a distinguishing feature of the invention.

The *Stevenson et al.*, invention excludes 1,3-diketone compounds as required by *Minigawa*. There is no teaching in *Minigawa* as to how this could be accomplished, when in fact it is a required element. There is nothing which would render one of ordinary skill in the art to look inside *Minigawa* when the goal was to formulate an additive which was limited to the fewest essential components. The *Stevenson et al.*, invention requires selection from a defined list of phosphite esters coupled with a defined amount of zinc. The *Minigawa* patent requires the above two components, namely, phosphite esters, zinc, **PLUS** a 1,3-diketone compound. How to eliminate the fugitive 1,3-diketone compound and still achieve the beneficial results of the *Stevenson et al.*, invention are not to be found within the *Minigawa* patent. The use of the "consisting essentially of" language in the pending claims eliminates this additional component and how to achieve this desirable effect is not taught, nor rendered obvious by *Minigawa*.

Further evidence to the unexpected positive and beneficial results from the elimination of the 1,3-diketone compound can be found with reference to FIG. 7. The

applicant has proven that using commercially available products, similar to that taught by *Minigawa*, (similar to the Ba/Zn stabilizer) the fugitive emissions are an order of magnitude higher than obtained using a Dover Chemical *PhosBooster DoverPhos* 12/675/Zn additive combination. There is no teaching within *Minigawa* that elimination of this type of emissive diketone compound would achieve this beneficial result and it took over 20 years before *Stevenson et al.*, discovered this result. And they did it using counterintuitive non-obvious logic which the *Prior Art* would teach as increasing the amount of additives into the PVC resin.

Housel '514

The examiner has rejected claims 42-49, 52-59, 62-69, 72-73 and 79-80 (see newly submitted claims 83-90, 93-100, 103-110, 113-114 and 120-121) under this section, subparagraph (a) as unpatentable over *Housel*, US 4,340,514 ('514). The examiner has represented that *Housel* teaches "non-toxic" liquid stabilizers for halogenated hydrocarbon resins in which zinc is in the form of a carboxylate at 0.1 to 3.5%, and which is compounded with the resin at 0.25 to 4% of the resin which was represented to overlap the claimed levels of zinc. The examiner indicated that this translated to 2.5 to 1400 phr which overlapped the claimed levels of zinc.

This overlap as stated by the examiner is simply not true. Converting 2.5 – 1400 phr into equivalent units of parts per million, results in 2500 to 1,400,000 ppm zinc. There is no overlap with the range of *Stevenson et al.*, which is 50 – 800 ppm zinc. How to achieve the desirable results of the *Stevenson et al.*, invention at zinc levels which are at least 500 times lower in zinc at the lower *Housel* limit is nowhere to be found in the '514 patent. In fact, one would be led to continually increase zinc levels by 1,750 to achieve the results found in *Housel*.

Part of the problem which was not recognized by *Housel* was the fact that the large amounts of zinc were masking the true effects which could be achieved by taking precisely the opposite approach taught in the patent, and rather than continuing to increase the amounts of zinc, to actually decrease the amount by orders of magnitude, to

levels which were unheard of in the *Prior Art*. By taking this approach, which is counter-intuitive to the wisdom in the PVC industry, *Stevenson et al.*, were able to only add the necessary components at levels which were required, rather than the sledge hammer massive quantity approach taken by others. This completely went against the grain of the teachings of the *Prior Art*, including those of *Housel*.

Additionally, *Housel* requires a dual resonate system by requiring both calcium and zinc resonates be present in the system. These rosin acids such as tall oil, rosin, pine stump rosin, wood rosin, gum rosin, are known additives which are not present in the *Stevenson et al.*, invention.

Additionally, the applicant would respectfully request the examiner to revisit his conclusion regarding the "non-toxic" labeling of the zinc as well as the form of the product, which the examiner characterized as zinc carboxylate. This would appear to be misleading, in that the '514 patent seems to describe it as a zinc resonate. While the patent does indicate that it is the reaction product of a zinc compound with a naturally occurring terpene hydrocarbon mono-carboxylic acid, this product is far from benign. The examiner has questioned the validity of the Pesticides Action Network web site, and therefore, the applicant's attorney would respectfully direct the examiner's attention to the website maintained by the Department of Transportation for Hazardous materials, in which zinc resonate is listed as a flammable solid in which protective clothing requiring positive pressure self-contained breathing apparatus was recommended. (See <http://hazmat.dot.gov/erg2000/erg2000.pdf>) The 2000 Emergency Response Guidebook additionally links zinc resonate to Guide 133, a copy of which is enclosed as well as Appendix B of the Department of Transportation Regulations, 49 C.F.R. Part 173, Subpart E, October 1, 1993 wherein zinc resonate is yet again listed as an ignitable solid.

Stevenson et al., remove this issue by eliminating resonates from their formulation. There is no teaching within *Housel* as to how this would be accomplished, nor is there any teaching as to why one would even want to eliminate this form of zinc. There is certainly no teaching or motivation to shift to lower zinc levels by the significant amounts used by *Stevenson et al.* This is not an incremental lowering of the amount of zinc which was effective to achieve the desired result, but it was orders of magnitude.

This is surely an unobvious result.

Rhodes et al., '200 in view of Nosu et al., '783 and Official Notice

The examiner has rejected claims 42-83 (see newly submitted claims 83-123) under this section, subparagraph (a) as unpatentable over *Rhodes et al.*, (US 3,755,200 or '200) in view of *Nosu et al.*, (US 5,120,783 or '783) and Official Notice. The examiner has represented that *Rhodes* teaches liquid stabilizer compositions for PVC comprising phosphite esters and metal carboxylates, including zinc. The desirability of using non-toxic metals was also represented to be within *Rhodes* with a preference for zinc stearate (col. 3, lines 26-48). The examiner indicated that official notice was cited merely to show what the applicant admits with respect to the phosphite esters that were well-known at the time of the invention for the purpose of stabilizing PVC. *Nosu* was indicated to be relied upon for its teaching that cadmium and barium are undesirable and that zinc and calcium are preferred for their low cost and low toxicity. This leaves the only real teaching reference as *Rhodes*.

The applicant's would respectfully request the examiner to revisit his initial conclusions regarding the patentability of the *Stevenson et al.*, invention in light of the following arguments. First, it is correct that zinc stearate is represented in the *Rhodes* '200 patent to provide excellent results, however, the patent provides no guidance as to how to remove the additional required components, namely a partial ester of a polyglycerol and an epoxy plasticizer, which are required for this system to be capable of forming a homogeneous solution which does not undergo phase separation when allowed to stand at ambient conditions for prolonged periods of time. Additionally, the '200 patent expressly teaches a specialized process by which the composition must be formed, namely "through the utilization of a specific blending technique which consists of first forming a solution of the metal salt, the epoxy compound and the organo-phosphorous, followed by heating ... The polyglycerol partial ester is then added to the resulting uniform solution and blended therewith." (See col 2, lines 11-24). The *Stevenson et al.*, invention does not require any epoxy compound. It functions without

having to process the components in a specialized manner as required by *Rhodes*.

Second, the majority of liquid stabilizer systems are liquid mixed metal soaps which have similarities to some Ca-Zn stabilizers and are generally in the form of a carboxylate. As in the case of Ca-Zn heat stabilizers, all of these products require the addition of co-stabilizers to provide optimum performance. These are the same type of products as are used with Ca-Zn stabilizers and solvents are sometimes incorporated.

And third, *Rhodes* uses triaryl phosphites, particularly tris(nonylphenyl) phosphite, (TNPP) which are not particularly suitable for use in the *Stevenson et al.*, invention. The *Rhodes* patent teaches a process in which the key is to heat the zinc stearate into the TNPP. This thrust of this patent is the preparation of improved antistatic and antifogging properties. There is no link that the applicant is aware of that improving these properties have any relationship to improving the heat or light stability of a halogenated resin.

Finally, in order to supplement the deficiencies of the above two references, the examiner has combined the teachings of *Nosu*. However, it is important to note in this patent that once again, in a manner similar to that of *Rhodes*, there are four required elements: namely (a) hydrotalcite; (b) zinc compound; (c) magnesium hydroxide; and (d) a beta-diketone and/or a phosphite compound. It is not clear why a researcher seeking to supplement the deficiencies of *Rhodes* would selectively seek out the teaching that zinc salts are preferred. It would appear to be a fairly selective reading of *Nosu*. Additionally, *Nosu* requires a diketone as part of the additive package, and as was discussed earlier with respect to *Minigawa*, diketones represent fugitive emission problems, which the *Stevenson et al.*, invention have overcome. Once again, FIG. 7 of the application is quite clear in that the selection of the phosphites and low levels of Zn are critical toward achieving that end. The scope of the phosphites that achieve that beneficial result have been narrowed and tailored in the pending claims, and coupled with the counterintuitive low levels of Zinc employed in the invention. This combination represents an unobvious result not predictable in any rational way from the teachings of either *Rhodes* or *Nosu* or combinations thereof.

Request for Reconsideration

Applicant believes that independent claims 83, 93, 103 and 113 clearly define over the prior art and that the distinctions between the present invention and the prior art would not have been obvious to one of ordinary skill in the art. Additionally, claims 84-92 depend from and contain all of the limitations of independent claim 83; claims 94-102 depend from and contain all of the limitations of independent claim 93; claims 104-112 depend from and contain all of the limitations of independent claim 103; and claims 114-123 depend from and contain all of the limitations of independent claim 113; and therefore, by the limitations contained in the base independent claims, are felt to be patentable over the prior art by virtue of their dependency from independent claims which distinguish over the prior art of record. All pending claims are thought to be allowable and reconsideration by the Examiner is respectfully requested.

It is respectfully submitted that no new additional searching will be required by the examiner.

The applicant has amended the claims in a manner in which all of the technical objections and/or rejections have been overcome. The applicant has narrowed the scope of the claimed range of phosphites which are effective as *PhosBoosters* in this invention. Additionally, when only the additive is being claimed, namely claims 83-123, the transition language "consisting essentially of" is employed, which does exclude other elements which are present in any significant quantities or which materially impact the characteristics of the final product. The fact that *PhosBoosters* can be used as a partial replacement to traditional PVC additive packages, is irrelevant to the patentability of the additive claims and the construction of the claim language. The position advanced by the examiner regarding the presence of organotin mercaptide in *Valdiserri* formulations should be rethought because the choice of the transitional phrase is outcome determinative and the presence of organotin mercaptides materially alter the characteristics of the additive.